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MASSACHUSETTS WATER RESOURCES AUTHORITY

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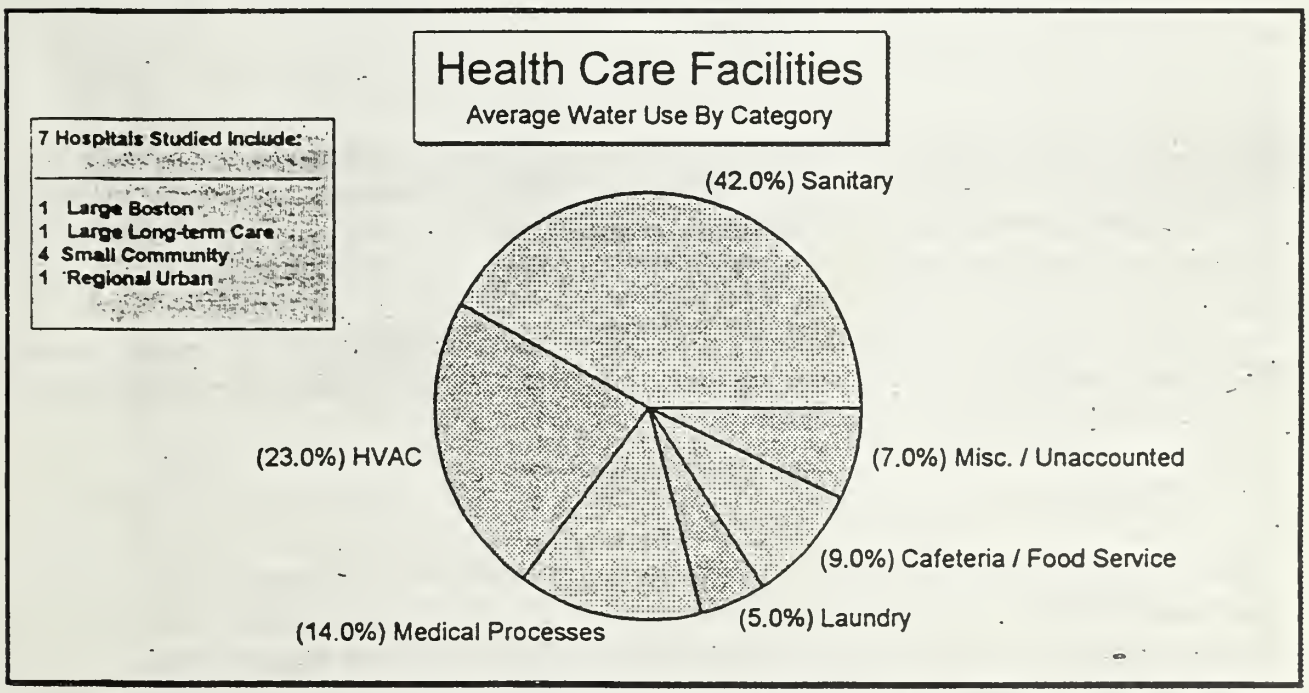
Industrial, Commercial & Institutional (ICI)
Water Management Program

Reducing Costs in Hospitals: A Case Study of Norwood Hospital

Hospital Water Use in the MWRA Service Area

The Metropolitan Boston area and surrounding communities host one of the largest centers for health care and medical research in the country. Health care institutions are consistently within the top 10 water users in their communities and together make up one of the largest categories of users in the MWRA service area. With the rise in water and sewer rates, water and sewer costs averaged 22% of total utility costs in selected Boston area hospitals studied.

Recent developments in health care services and advancements in medical technology have resulted in a restructuring of hospitals. Changes involve a downward trend for in-patient admissions and a shift toward hospital specialization. Renovations of facility space and equipment replacement provide an opportunity for water conservation and significant reduction in operating costs in the competitive area of health care. This document provides information and a case study example demonstrating how innovative implementation of water efficiency measures makes savings achievable.



Facilities studied in the chart include hospitals with 138 to 550 bed capacities, in-patient admissions of 5,100 to 11,600 per year and annual water usage ranging from 15 to 67.2 million gallons.

MWRA Hospital Information

The MWRA's technical assistance program (ICI) has helped a variety of health care facilities, mainly hospitals, understand how increased awareness of water use and minor investments can have major impacts on water and sewer costs. Surveys conducted through the ICI program show a potential average reduction in annual water use of 19% per facility.

Typical water use per capita in hospitals ranges from 40 gallons per day to 350 gallons per day. The allocation of water at a facility varies depending on the services provided, in-patient vs. out-patient visits, staff attendance, equipment used, age of the facility, and periodic maintenance practices followed. While there is tremendous variety among facilities, the ranges shown give an indication of most hospitals' water use.

While conducting a water-use survey, it is beneficial to examine the different water uses in each facility to determine high use areas. In hospitals, total water use can be divided among five major categories: sanitary, HVAC, medical processes, cafeteria, and laundry services. The pie chart on page one illustrates the average percentage of total water use allocated to each of the categories.

Each category will have a typical range of consumption based on the services provided within the facility. Once these categories and percentages are organized into a readable chart, Water Efficiency Measures (WEMs), actions undertaken to save water, should be generated and compared to determine which measures offer the greatest potential savings or quickest paybacks.

Typical water use categories and examples of WEMs found in hospitals have been outlined in more detail in the MWRA's bulletin **Water Efficiency & Management for Hospitals** available from the ICI program.

Case Example: NORWOOD HOSPITAL

An illustration of the success of implementing WEMs is demonstrated through a case example. The focus of this document is to offer a strategy to facility personnel who are considering initiation of a Water Management Plan. A Water Management Plan is developed by facility staff as an action program for efficient water use.

In addition to discussing the significant measures implemented in the hospital with regard to costs and savings, the following pages summarize the steps one facility manager has taken for successful implementation of a Water Management Plan.

More detailed information regarding initiating a Water Management Plan at your facility is contained in the MWRA's ***A Guide to Water Management.***

Norwood Hospital

Water Use in 1991:	**51.2 Million Gallons**
Water Use in 1994:	**36.6 Million Gallons**
Reduction in Use:	**29%**

Major WEMs Initiated by Facility Manager and Implemented at Norwood Hospital:

- ***Elimination of seal and cooling water on medical air compressors and vacuum pumps*** - Recirculating seal and cooling water for four vacuum pumps and one medical compressor as well as removing a vacuum pump that was not needed resulted in a net annual savings of **8.5 million gallons**.

Project Cost:	$19,500
Annual Savings:	$55,686
Payback:	0.35 yrs

- ***Sanitary retrofits: aerators and flush valves*** - Replacing the flush valves on toilets and urinals, and installing low-consumption aerators on all lavatory faucets resulted in a savings of **3 million gallons** per year. This work was performed by an outside contractor.

Project cost:	$8,092
Annual Savings:	$19,679 (Does not include heat savings)
Payback:	0.41 yrs

- ***Refrigeration System Retrofit*** - Facility staff discovered the refrigeration system serving the morgue was cooled with once-through cooling water. In 1994 the system was replaced with an air-cooled unit, thereby eliminating **2.1 million gallons** per year.

Project Cost:	$5,500
Annual Savings:	$13,750
Payback:	0.40 yrs

In 1995 the MWRA's ICI Program completed a Water Management Survey for the Norwood Hospital offering additional water saving ideas which are currently being reviewed by facility management:

- ***Increase the cooling tower concentration ratio from 4 cycles to 12.*** Reducing the amount of water that is bled from the cooling tower would result in a savings of roughly **600,000 gallons** per year. The chemical treatment vendor should be contacted to confirm that this will have no adverse effect on tower operation. Since this measure requires only the adjustment of the set point on the bleed-off controller there is no initial cost -- payback is immediate.

Project Cost:	$0
Annual Savings:	$3,900
Payback:	Immediate

- ***Recirculate <u>non-contact</u> sterilizer cooling water.*** By incorporating an available retrofit system that collects, cools, pumps, and recirculates the cooling water to the sterilizers, about **4 million gallons** per year can be saved.

Estimated Cost:	$25,300
Projected Savings:	$27,500
Payback:	0.92 yrs

The following steps proved successful in implementing the water management plan at Norwood Hospital.

1. *Develop* **Water Management Plan**

- Investigate current water uses and categorize (as shown in pie chart on front). Estimate the water used in general categories.
- Identify measures through independent research and solicit water savings and cost information from different sources: professional associations, trade groups, vendors, MWRA.
- Set goals. Prioritize measures to implement depending on capital budgets, paybacks, percentage reductions, cost-benefit analysis.

2. *Present* **to Administration & Finance**

- Make detailed proposals of projects to administrators illustrating required payback period (1 year or less in the case of Norwood Hospital) to establish plan.
- Involve financial leaders first; show vendor quotes, contractor bids, man hours and scheduling of projects and when savings are expected.
- Indicate that savings realized from water efficiency measures can be directed back to fund more projects related to water conservation measures.

3. *Implement* **the Plan**

- Prioritize projects - do major projects with significant savings first, use savings to fund future projects and prove credibility of plan.
- Educate staff on individual responsibilities.
- Make an ongoing commitment to continuous improvement; monitor savings, continue to track water use; avoid complacency, stay aggressive, don't be satisfied.

For more information:

Call the MWRA's ICI Program at (617) 242-7110

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